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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,959	07/22/2005	Thomas Juestel	PHDE020192US	3623

38107 7590 05/16/2008

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER	
ELEY, JESSICA L	
ART UNIT	PAPER NUMBER
2884	

MAIL DATE	DELIVERY MODE
05/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,959	JUESTEL ET AL.	
	Examiner	Art Unit	
	JESSICA L. ELEY	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-5,7,8 and 20* is/are allowed.

6)☒ Claim(s) *9-19* is/are rejected.

7)☒ Claim(s) *21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Art Unit: 2884

DETAILED ACTION

Response to Arguments

Applicant's arguments, see page 7 paragraph 1, filed 15 February 2008, with respect to claims 1-5, 7, 8, and 20 have been fully considered and are persuasive. The rejection of 21 August 2007 has been withdrawn.

Applicant's arguments with respect to claims 9 and 17 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9-13, are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Eijk et al (Van Eijk) Journal paper entitled "Nd^{3+} and Pr^{3+} Doped Inorganic Scintillators," further in view of Boerner et al (Boerner) US 2001/0006214 A1, and further in view of Tonami et al (Tonami) US 5,909,029

Regarding **claims 9 and 10** it is held that Van Eijk teaches a device for the detection of input radiation comprising a Pr^{3+} activated scintillator (Table 2, page 666), converting input radiation into UV radiation (Table 2 and Figure 3) and a photodiode to convert the optical signal form the scintillator into an electrical signal (top of first column of page 665), wherein the scintillator is used in a PET or gamma camera (i.e. SPECT) imaging system (Table 1 and first column of page 664). Van Eijk does not specifically teach using a color converter.

However, Boerner does teaches a scintillator layer that emits radiation in a short wavelength (i.e. bordering the UV region around 400nm) and using a color-transforming layer to convert the emitted radiation to a wavelength more suited to the spectral sensitivity of the detector (abstract, ¶0008, ¶0016, ¶0017). Since the luminous color-transforming layer taught by Boerner relies on the basic teaching of photoluminescence (¶0023) wherein light of a higher energy (such as UV) to a lower energy (such as visible), regardless of the example that proceeds the invention encompasses any range of wavelengths wherein the luminescence from the scintillator (higher energy) is converted to "the spectral-sensitivity" of the photodiode (¶0022). Thus, Boerner teaches that such a technique enables a larger part of the X-ray radiation to be used for image analysis (abstract).

Thus, it would be obvious for a person having ordinary skill in the art at the time the invention was made to provide a color-converting layer between the scintillator and the photodiode so as to convert the emitted radiation to a wavelength more suitable for the spectral sensitivity of the detector, thereby allowing a larger part of the X-ray radiation to be used for image analysis, as taught by Boerner.

The combination of Van Eijk and Boerner are silent with regards to the color converter being a polymer light guide.

However, such combinations are known in the art. For example, Tonami teaches a detector for X-ray imaging using a scintillator **1** and a photodiode **2** (Figure 3). Tonami further provides a light guide, in the form of an array of optical fibers **4** between the scintillator **1** and the photodiode **2**. Tonami teaches that such a configuration prevents the dispersion of light in the lateral direction of the photodiode surface as well as serving to protect the photodiode elements during handling (column 3, lines 25-41).

Thus, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a light guide between the scintillator and the photodiode so as to prevent the lateral dispersion of light while protecting the photodiode elements during handling, as taught by Tonami. The incorporation of the color-transforming component suggested by Boerner either as a dopant in the optical fiber plate or as a separate layer thereon would have been further obvious to one of ordinary skill in the art since polymer fiber optics are known in the art as are wavelength shifting dopants added thereto (see, for example, Anderson et al.)

Regarding **claim 11** specifically, Boerner teaches the converter layer working with an array of photodiodes (¶0022) wherein the color-converter is between the scintillator and the array of photodiodes.

Regarding **claim 12**, Van Eijk does not specifically detail the decay time for the scintillator being 9 ns, he does stress the importance of the decay time for various applications (page 664). The general condition of decay times for Pr^{3+} doped inorganic scintillators being taught by van Eijk (Table 2) it would be obvious to one of ordinary skill in the art at the time the invention was made to use a scintillator with a decay time of 9 ns since the discussed scintillator material comprises a downward trend from 20 ns to 18 ns to 14 ns making 9 ns obvious by routine experimentation.

Regarding **claim 13**, for similar reason to claim 12, it is obvious that, while van Eijk does not specifically detail the decay time for the scintillator being 16 ns, he does teach a range of decay times, 20 ns, 18 ns, and 14 ns (Table 2) for this scintillator that overlaps this value.

Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Eijk and Boerner as applied to claim 9 above, and further in view of Juestel et al. (Juestel) US 6,734,631 B2.

Regarding **claim 14**, Juestel teaches that a suitable alternative to YPO_4:Pr (column 3 lines 48-50) is $CaLi_2SiO_4$:Pb (column 3 lines 41-44). While Juestel does not directly teach this host lattice being used with Pr and Na, it would be obvious to one of ordinary skill in the art at the time the invention was made to try such combination given the fact that Juestel teaches that the activator Pr^{3+} is a preferred activator (column 2 lines 5-7). Furthermore it is known in the art to use Na as an activator since this emits in the range of 430nm (Boerner, Table 1) which is required for PET applications as taught Van Eijk (Table 1) where it is clear that the wavelength emission must be greater than 300 nm (Van Eijk, Table 1).

Regarding **claim 15**, Juestel teaches a phosphor converting layer in the VUV range and has a high absorption coefficient (column 2 lines 8-10) that is selected from the group containing $LaPO_4$:Pr (column 2 lines 21-24). It would be obvious for a person of ordinary skill in the art at the time the invention was made to use the material taught by Juestel with the invention taught by Van Eijk since the material taught by Juestel is a taught as an alternative to the YPO_4:Pr phosphor taught by Van Eijk and thus an obvious alternative.

Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Eijk and Boerner as applied to claim 9 above, and further in view of Zagumennyi et al US 6,278,832 B1 (henceforth referred to as Zagumennyi).

Regarding **claim 16**, the teachings of Van Eijk and Boerner address all the limitations of parent claim 9, as discussed above. Van Eijk and Boerner do not expressly include the active scintillator material $(Lu_{2-x}Y_x)SiO_5$:Pr where $0 \leq x \leq 1$ and $(Lu_{1-x}Y_x)Si_2O_7$:Pr where $0 \leq x \leq 1$. However such material is known in the art of scintillating substances. Zagumennyi teaches using the known scintillating material Lu_2SiO_5 with Ce^{3+} doping in column 7 lines 32-39. It would be obvious to one of ordinary skill in the art at the time the invention was made to use the known scintillating material Lu_2SiO_5 with Pr^{3+} doping as taught by Van Eijk, instead of the Ce^{3+} doping taught by Zagumennyi, since Van Eijk teaches that most attention in the art is paid to Ce^{3+} but suggests to practitioners doping with Pr^{3+} and Nd^{3+} since these could be of interest (page 667, III Conclusion).

Regarding **claim 17-19**, Van Eijk teaches a method of imaging comprising receiving X-rays and low energy gamma rays [reads on: γ quantum] with a device for the detection of input radiation comprising a Pr^{3+} activated scintillator (Table 2, page 666), converting input radiation into UV radiation (Table 2 and Figure 3) and a photodiode to convert the optical signal form the scintillator into an electrical signal (top of first column of page 665), wherein the scintillator is used in a PET or gamma camera (i.e. SPECT) imaging system (Table 1 and first column of page 664), in which case the electric signal generated by the photodiode would be used to generate an image. Van Eijk does not specifically teach using a color converter or the lattice support for the Pr^{3+} scintillator being one of $LuCl_3$:Pr, $LuBr_3$:Pr, $(Lu_{2-x}Y_x)SiO_5$:Pr where $0 \leq x \leq 1$, $(Lu_{1-x}Y_x)Si_2O_7$:Pr where $0 \leq x \leq 1$, and $(Lu_{1-x}Y_x)BO_3$:Pr where $0 \leq x \leq 1$.

Art Unit: 2884

Boerner teaches a scintillator layer that emits radiation in a short wavelength (i.e. bordering the UV region around 400nm) and uses a color-transforming layer to convert the emitted radiation to a wavelength more suited to the spectral sensitivity of the detector (abstract, ¶0008, ¶0016, ¶0017). Since the luminous color-transforming layer taught by Boerner relies on the basic teaching of photoluminescence (¶0023) wherein light of a higher energy (such as UV) to a lower energy (such as visible), regardless of the example that proceeds the invention encompasses any range of wavelengths wherein the luminescence from the scintillator (higher energy) is converted to "the spectral-sensitivity" of the photodiode (¶0022). Thus, Boerner teaches that such a technique enables a larger part of the X-ray radiation to be used for image analysis (abstract).

Thus, it would be obvious for a person having ordinary skill in the art at the time the invention was made to provide a color-converting layer between the scintillator and the photodiode so as to convert the emitted radiation to a wavelength more suitable for the spectral sensitivity of the detector, thereby allowing a larger part of the X-ray radiation to be used for image analysis, as taught by Boerner.

Van Eijk and Boerner do not expressly include the active scintillator material $(Lu_{2-x}Y_x)SiO_5$:Pr where $0 \leq x \leq 1$ and $(Lu_{1-x}Y_x)Si_2O_7$:Pr where $0 \leq x \leq 1$. However such material is known in the art of scintillating substances. Zagumennyi teaches using the known scintillating material Lu_2SiO_5 with Ce^{3+} doping in column 7 lines 32-39. It would be obvious to one of ordinary skill in the art at the time the invention was made to use the known scintillating material Lu_2SiO_5 with Pr^{3+} doping as taught by Van Eijk, instead of the Ce^{3+} doping taught by Zagumennyi, since Van Eijk teaches that most attention in the art is paid to Ce^{3+} but suggests to practitioners doping with Pr^{3+} and Nd^{3+} since these could be of interest (page 667, III Conclusion).

Regarding **claims 18 and 19**, the combination of Van Eijk, Boerner, and Zagumennyi disclose all the limitations of parent claim 17, as discussed above. Further Boerner allows for the color transforming luminous substance (¶0012-¶0013) to be incorporated in a polymeric layer between (¶0017) the scintillator and photodiode [reads on claim 18] or in a separate layer [reads on claim 19] between the scintillator and photodiode (¶0028).

Allowable Subject Matter

Claims 1-5, 7, 8, and 20 are allowed.

Claim 21 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1, the prior art of record does not disclose or reasonably suggest, along with the other claimed limitations, a device for generating images and/or projections by means of an imaging method, which device includes a device for the detection of input radiation which includes at least one acquisition element which comprises a sensor with a Pr^{3+} -activated scintillator: namely wherein the Pr^{3+} -activated scintillator is chosen form the group LuF_3:Pr, $LuCl_3$:Pr, and $LuBr_3$:Pr.

Regarding claim 21, the prior art of record does not disclose or reasonably suggest, along with the other claimed limitations a device for detecting input radiation which includes at least one acquisition element which comprises a color converter that converts UV radiation to an optical signal, wherein the color converter is doped with a Courmarin based substance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessica L. Eley whose telephone number is (571) 272-9793. The examiner can normally be reached on Monday - Thursday 8:00-6:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. L. E./
Examiner, Art Unit 2884
/David P. Porta/

Supervisory Patent Examiner, Art Unit 2884